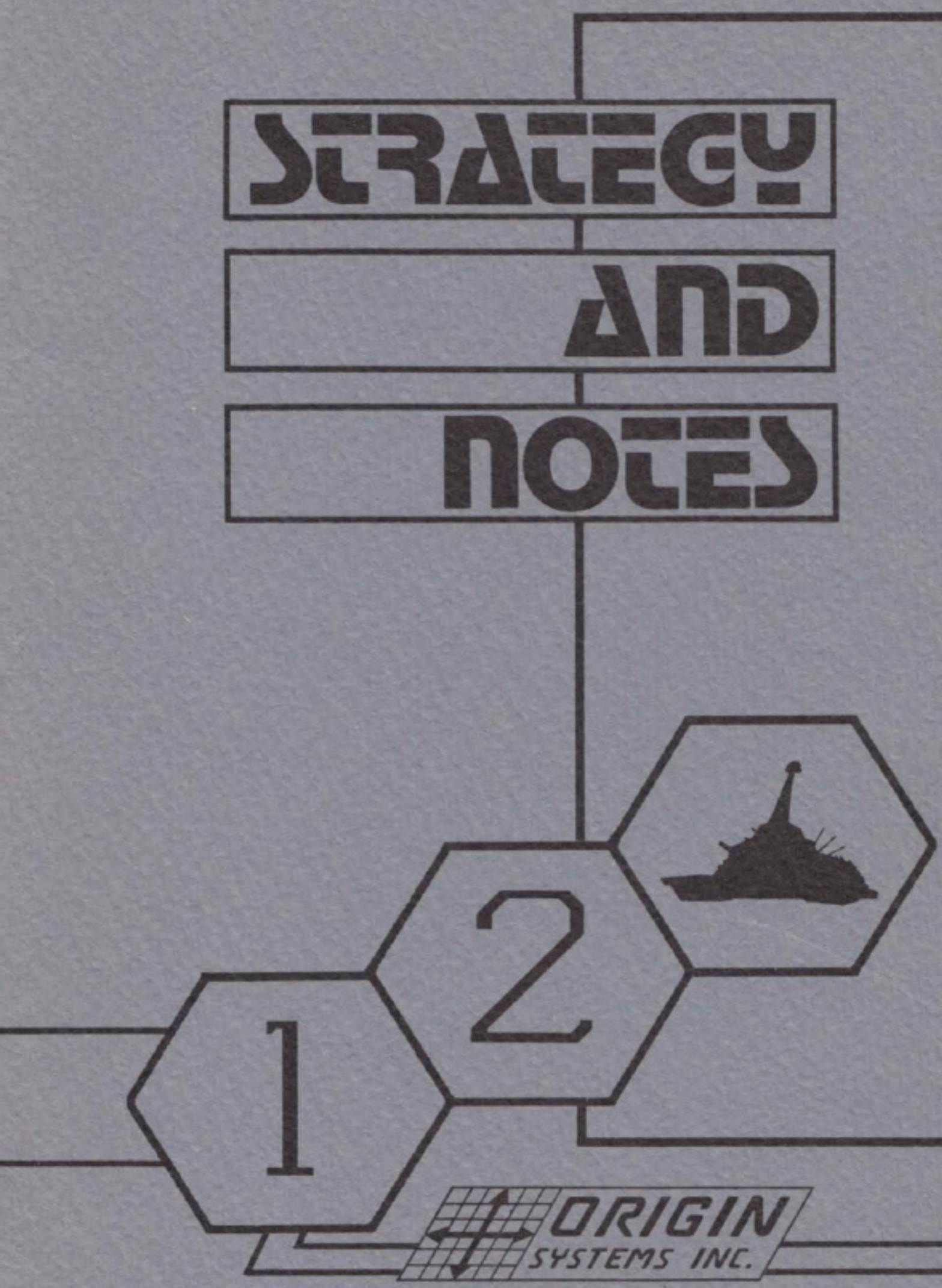
STRATEGY AND NOTES



ORIGIN SYSTEMS INC.

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Encounter

The Command Post was well guarded. It should have been. The hastily constructed, unlovely building was the nerve center for Paneuropean operations along a 700-kilometer section of front—a front pressing steadily toward the largest Combine manufacturing center on the continent.

Therefore, General DePaul had taken no chances. His command was located in the most defensible terrain available—a battered chunk of gravel bounded on three sides by marsh and on the fourth by a river. The river was deep and wide; the swamp, gluey and impassable. Nothing bigger than a rat could avoid detection by the camera icons scattered for sixty kilometers in every direction over land, swamp, and river surface. Even the air was finally secure; the enemy had launched at least fifty heavy missiles yesterday, leaving glowing holes over half the island, but none near the CP. Now that the jamscreen was up, nothing would get even that close. And scattered through the twilight were the bulky shapes of tanks and Ground Effect Vehicles—the elite 2033rd Armored, almost relaxed as they guarded a spot nothing could attack.

Inside the post, too, the mood was relaxed—except at one monitor station, where a young lieutenant watched a computer map of the island. A light was blinking on the river. Orange: Something was moving out there where nothing should move. No heat. A stab at the keyboard called up a representation of the guardian units . . . not that any should be out **there,** thirty kilometers away. None were. Whatever was out there was a stranger—and it was actually **in** the river. A swimming animal? A man? Ridiculous.

The lieutenant spun a dial, moving a dot of white light across the map and halting it on the orange spot with practiced ease. He hit another key, and an image appeared on the big screen . . . pitted ground, riverbank . . . and something else, something rising from the river like the conning tower of an old submarine. But he knew what it really was, he just could not place it . . . and then it moved. Not straight toward the camera icon, but almost. The lieutenant saw the "conning tower" cut a wake through the rushing water, bounce once, and begin to rise. A second before the whole shape was visible, he recognized it—but for that second he was frozen. And so thirty men with their minds on other things were suddenly brought to heart-pounding alert, as the lieutenant's strangled gasp and the huge image on his screen gave the same warning. . . .

"OGRE!"

Less than three minutes had passed. After the initial seconds of panic, the Command Post had settled down to business. Instead of masterminding an attack, it was fighting for its own life. Men spat orders into throat mikes, eyes on the big screen. The orange dot that was the Ogre was six kilometers closer, but green sparks were moving out to meet it—the men and machines of the 2033rd.

The general entered at a run. "Get me a picture!" he ordered. The screen flickered; moving dots gave way to an image. The huge machine rumbled over the landscape, incredibly fast for something so huge. Guns bristled. The tower on top rose twenty meters high.

"A Mark V," said the general. "They really want us, all right. **Who had the watch?"**
"I . . . I did, sir."
"Where'd it come from?"
"Sir, the river. I got a movement indication from the center of the river—I saw it come up. **Nothing** before that. I swear it, sir."

The general started to reply, then checked himself. Suddenly, he stepped to the keyboard. The map reappeared (the orange dot was closer) and shrank. They saw their island from fifty—a hundred—kilometers in the air.

The general traced the river-course. "Here . . . and here. Yes, they could have done it."
"Sir?"
"Underwater. It went into the ocean **here.** Through the delta—up the river and out. Very clever. I wonder . . . No, they just outfoxed us. As you were, son."

*****

The Ogre was twenty kilometers away. On the big map, a ring of green around it showed missile tanks ready to move in; more green dots, visibly moving, were GEVs harassing the enemy machine. As they watched, one GEV light went out. Another stopped moving and began to blink plaintively. The Ogre moved toward it.

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Twelve minutes since the shooting had started. The Ogre was fifteen kilometers away. Faced by eight missile tanks, it had slipped to the side; three of the tanks were gone, and

two others had never gotten in range. But the Ogre had paid; it was moving slowly now. On the big map. three more green dots moved toward it. The heavies were going in.

"Mercier to CP. We've spotted it." The general punched for an image. There it was. Four of the six missile tubes were empty; two of the "small" guns along one side were scrap. Loose tread flapped; damaged motors sparked. Its guns moved and flashed. Then the screen dimmed as a nuclear warhead hit the Ogre. The image returned. There was a new crater along one of the armored sides—nothing more.

"Get those guns, Commander." The general's voice was calm; Mercier's reply was equally mild. "Trying, sir. It ducks." Then jubilation. "Good shot. Fair! You got it. **Hit** the misbegotten pile of junk." The big screen was completely dark. It came on again, from a different angle. The Ogre was hurt. One of those big front guns was gone—completely. The other was clearly wrecked.

"Good man, Mercier! Who did that? Commander Fair? . . . Mercier? . . . Fair? . . ."

"This is Kowalski in 319. It got Fair about three times. I can't find Mercier."

On the screen, one heavy tank faced the Ogre. Two GEVs swept in and out. Missile tanks and infantry moved closer—too slowly.

"Here it comes." Kowalski—commander of the last heavy. "You'll have to shoot better than that, you gadget. GOTCHA! Took out its . . ."

Static. Then a new voice. It sounded quite human. And amused. "Gotcha."

*****

The Ogre rolled on. It was within howitzer range now, and the big missile cannon were scoring on it. Its missiles were gone, but it still had guns. The infantry had met it—finally—but powered armor notwithstanding, they were dying as fast as they came in.

"It's committed," said a big major, his eyes on the screen. "It can't afford to stop now." The general nodded. "Get behind it," he said into his mike. "It's after the howitzers. They're killing it."

In the flame-lit darkness, men heard the scrambled transmission. Men, and one other. The Ogre took in the surrounding terrain, considered the location of the Command Post and the howitzers, watched the movement of its enemies, weighed the order it had decoded. **Behind,** it thought. **They have made a mistake.**

*****

It was very close now. Had the Command Post had windows, the men inside could have seen the explosions. The Ogre was moving very

slowly now, but two guns still spoke. It no longer dodged; it was a juggernaut, coming straight for its target.

Inside, the general's face was gray. He spoke to no one in particular "Smart. That thing is smart." A scream still echoed in the big room—the scream from the last missile tank commander. Out of Ogre's path, safe behind a three-meter ravine, lashing out at the metal giant—and the thing had changed course, ignoring the howitzers, walking over the gully like it wasn't there, crushing the smaller tank. Two GEVs had died a second later: their speed was their best defense and the Ogre had outguessed them. The side trip had given the howitzers a few more minutes; then they, too, had died.

The screen showed the Ogre grinding on—a shambling monster, barely able to move. "The treads . . . hit the treads," whispered the general. "Stop that thing." The image changed, and he saw what was left of his force: three GEVs and a handful of infantry.

The Ogre rolled on . . .

Strategic Suggestions For Alliance Commanders

Basic Strategy

The harsh truth is that you must ***always*** take whatever steps are necessary, no matter how drastic, in order to hold your ground and to preserve your Command Post. If your Command Post is lost, battle statistics suggest that the remainder of your force will also be lost, as will the Conflict Zone itself.

Successful defense against an Ogre means meeting two basic goals: ***Disarming*** the Ogre, and ***Immobilizing*** the Ogre. Any plan which meets these goals is a ***good*** plan! Alliance commanders have devised a wide variety of battle plans which both disarm and immobilize Ogres. Though battle plans or strategies have almost limitless variety, most successful plans have certain basic features in common. For simplicity's sake, three basic defensive points your plan should observe are:

Delay the Ogre As Soon As Possible: As it starts its invasion, an Ogre is as fast or faster than all Alliance infantry squads, missile tanks, and heavy tanks. There is a very real danger of the Ogre ***outrunning*** the first wave of defenders it meets. If this happens, second wave forces will have to bear the brunt of a full-strength Ogre attack. To prevent this sort of Ogre maneuver, most successful defense strategies call for forces to strike early and hard at the Ogre's tread sections (giving secondary attention to knocking out the Ogre's longer range weapons). We must be candid; opening attacks against the Ogre's mobility will cost you casualties. Failure to slow the Ogre early on, though, will cause even heavier losses later on.

As a general rule, try to slow the Ogre's speed before it has progressed more than 1/3rd to 1/2 of the distance to your Command Post. To let the Ogre proceed at full speed beyond this point is to invite disaster.

Eliminate Major Ogre Weapons Systems: As the Ogre approaches the midpoint of the Conflict Zone, Alliance commanders usually concentrate on knocking out its most powerful weapons. The rationale is that, from the midpoint of the Conflict Zone, the Ogre's longer range weapons are almost within range of your Command Post. You need to prevent a long range attack, and instead force the Ogre to travel the full length of the Zone in its attempt to destroy your Command Post. In this way, you force the Ogre to expose itself to defensive fire which it cannot easily return. Appropriate targets would be (in descend-

ing order of importance) Ogre missiles, main batteries (if any remain), and secondary batteries. While your forces "whittle away" at the Ogre's weapons, it is important to continue your attack against the Ogre's treads. Remember, the Ogre can hurt you both with its weapons ***and*** its bulk.

Bring the Ogre to a Standstill: When an Ogre is slowed and mostly disarmed, commanders usually make an immediate and concerted effort to shoot away the Ogre's remaining tread sections. Naturally, the idea is to bring the Ogre to a halt before it has a chance to roll over your Command Post. Oddly enough, inexperienced commanders sometimes overlook this point; it seems they become so preoccupied with fighting the Ogre's weapons that they forget the machine is about to crush them. This is a fatal mistake.

A key point to remember is this: An utterly disarmed but mobile Ogre can ***still*** accomplish its combat mission (i.e., destroying your Command Post). The same is not (usually) true of a completely immobilized Ogre. Let these simple truths guide you as you set your combat priorities.

Three Approaches to Defense

As mentioned above, Alliance commanders have been inventive in creating defenses which can defeat Ogres. We hope you will carry on in this tradition of creativity. However, we feel your training will not be complete until you are exposed to what we feel are the three "classic" Alliance defense strategies.

The Multiple Howitzer Defense

The basic concept behind this defense is easy to grasp. You build your entire defense around a sizeable number of our most powerful and longest range weapons; namely, the howitzers. By placing three, four, or more howitzers so that their fields of fire overlap and reinforce each

other, you create a "Howitzer Wall" through which the Ogre must pass if it hopes to reach your Command Post. The theory is that the Ogre can reach your Command Post only by exposing itself to punishing fire from several sides. Naturally, the Ogre will try to eliminate your howitzers as quickly as it can. If your howitzers are correctly placed, though, the Ogre will have to knock out ***more than one*** howitzer in order to clear a path toward your Command Post. In the time it takes the Ogre to do this, the outlying Howitzers and supporting mobile armor and infantry should have a chance to harass the Ogre and, it is hoped, bring it to a standstill.

Key Points: Three key points determine the success of the Multiple Howitzer Defense.

First, supporting mobile armor (and infantry) must eliminate many of the Ogre's longer range weapons ***before*** the Ogre reaches the howitzer field. If this point is not observed, the Ogre will have a relatively easy job of rupturing your howitzer wall. If the wall collapses too quickly, your Command Post will soon be destroyed.

Second, proper placement of howitzers is ***critical***. You must be careful to make sure that the howitzer wall ***surrounds*** your Command Post with a thick, dense cushion of defensive fire. If you inadvertently leave a gap or thin spot in the wall, the Ogre will spot this flaw and take advantage of it. You must also design your wall so that all howitzers share an equal part of the wall's defensive load. If you happen to overload a single howitzer, the Ogre will recognize the imbalance and focus its attack on the overstrained howitzer. When that howitzer falls, your entire defense collapses.

Finally, your reserve support armor and infantry must be prepared to augment (and to complete) the howitzer's attacks. Ogres are enormously sturdy vehicles, and it is foolish to believe that howitzers alone can stop them. As the Ogre and howitzers lock in battle, it is imperative for support forces to press home the attack (especially the attack against the Ogre's tread sections). If support forces hang back, they are likely to be overrun by a badly damaged but still mobile Ogre.

Comments: The Multiple Howitzer Defense can be used against both Mk III and Mk V Ogres, but it is much more likely to succeed against the Mk III version. This is true primarily because of the Mk III's relative shortage of long range weapons (the Mk III carries only one main battery and two missiles, while the Mk V carries two main batteries and six missiles). Against a Mk V Ogre, the multiple howitzer defense does not fare so well. The larger tank is all too likely to evade or out-gun your first wave defenders, and then is apt to approach your howitzers with full speed and a full complement of long range weapons (***not*** a desirable scenario).

Be aware that howitzers are very expensive weapons. Thus, when you

choose to use a multiple howitzer defense, you must be ready to accept a tradeoff in the size of your mobile armor support force. You must also be prepared to manage that small support force with consummate skill.

The GEV-Centered Defense

The GEV-centered defense is built around a mobile armor force composed primarily of GEVs (some commanders go so far as to use nothing but GEVs!). The GEV may seem an unlikely vehicle upon which to base a defense, but we must not sell the GEV short. While it is not heavily armed nor heavily armored, the GEV has a tremendous advantage in sheer ***speed.***

A basic axiom of defensive warfare is that the defender must somehow direct more fire toward an opponent than the opponent can return. With this simple axiom in mind, the importance of the GEV's speed advantage over the Ogre becomes clear. Swarming GEV attack groups can close on the Ogre, fire their weapons, and then escape to relative safety—all within the time it takes a conventional vehicle to close and fire. At first, not all GEVs will escape the Ogre's pursuit. But if GEV attacks are concentrated early enough, the Ogre's ability to pursue will soon be cut down. Once the Ogre's maneuvering speed is cut back, its weapons systems become fairly easy prey for the remaining GEVs (and other support forces). Finally, when the Ogre is disarmed (or all but disarmed), remaining Alliance forces can attack the Ogre's tread sections without facing much return fire. If the attack sequence is well-timed, the Ogre will be brought to a halt before it can touch the Command Post.

Key Points: By attending to several key points you can help your chances of making a successful GEV-based defense.

The Defensive "Scramble:" To prepare for Zone defense, your GEVs should be spread evenly across an intercept line placed fairly close to the mouth of the Conflict Zone. We stress the need for ***even*** distribution of forces on the line. If you leave thin spots in your defensive line, the Ogre will discover and take advantage of them. Instead, your aim should be to place your GEVs such that most of them can intercept an encroaching Ogre soon after an invasion begins.

Early Attack: When your frontline GEVs make initial interceptions, their fire should be directed almost exclusively toward the Ogre's tread sections (with perhaps a bit of fire aimed toward the Ogre's main batteries). During these early attacks, your GEVs' primary goal must be to re-

duce the Ogre's speed by one third (or more). Attacks on treads will be costly in terms of lost GEVs; however, failure to slow the Ogre early on can prove much more costly in the long run. Resist the temptation to make premature attacks on Ogre weapons. Once an Ogre's pursuit speed is cut down, it is much easier for GEVs to eliminate weapons without facing severe return fire.

Middle Phase of Attack: After the Ogre's speed has been cut by 1/3rd, your forces should shift the focus of their attack to the Ogre's weapons systems. The aim of the middle phase of attack is to eliminate almost all of the Ogre's weapons systems (leaving it armed with nothing more than its antipersonnel guns and perhaps one or two secondary batteries). The idea is to prevent the Ogre from destroying your Command Post with a "cheap shot" taken at long range: instead, you need to force the Ogre to expose itself to a prolonged attack from your GEVs and infantry.

Final Phase of Attack: When the Ogre approaches your Command Post, it is time to redirect your focus of fire once again. Whether or not your middle phase attack on the Ogre's weapons was successful, you must now throw all the firepower you can muster against the Ogre's tread sections. Recognize that a disarmed but mobile Ogre is still a formidable weapon. If, at this stage in a battle, you have lost a great number of GEVs, infantry forces become critical. Infantry must present solid resistance to the approaching Ogre, and must press home the attack against its treads. Infantry casualties will likely be very high. A spirit of sacrifice is essential. In fact, if your situation becomes desperate, you may need to sacrifice GEVs or other vehicles by ramming the Ogre (to destroy its final few treads). If you must use (fatal) sacrificial maneuvers, make sure they prevent the Ogre from crushing your Command Post. Otherwise, we suggest you preserve your armor units in the hope of destroying the Ogre before it can escape.

Comments: the GEV-centered defense is built on three distinct phases: First, slowing the Ogre somewhat; second, disarming the Ogre almost completely; and third, bringing the Ogre to a complete standstill. It is very important to execute each phase in a crisp, disciplined way. When GEV-centered defenses fail, it is often because the defensive commander fails to pay attention to the basics. For example, the commander fails to slow the Ogre early on, and hence loses too many GEVs to follow through with later phases of his attack. Or the commander continues the middle phase of his attack too long, only to see a disarmed but quite mobile Ogre flatten his Command Post. If you use the GEV-centered defense, do your best to complete each phase of your attack ***in the proper sequence.***

Commanders should be wary of the Ogre's attack algorithms. We have reason to believe the Ogre can recognize a GEV-centered defense, and that it is programmed to do all it can to disrupt early phases of the GEVs' attack. For example, an Ogre may respond to early GEV attacks by moving ***laterally*** or ***rearward*** to pursue escaping GEVs. If the Ogre employs these tactics, it is important for you to regroup your forces and calmly proceed with your battle plan. If you let yourself be thrown by unpredictable moves on the Ogre's part, you are apt to lose sight of your combat goals. Steady nerves and sound tactics can help prevent this from happening.

On a tactical level, we suggest you pay close attention to the escape paths your GEVs take after they first fire on the Ogre. All too often, commanders take the unsophisticated approach simply of ordering their GEVs to get as far from the Ogre as possible. The problem with this approach is that it also tends to leave small groups of GEVs isolated far ***from each other.*** This approach can even leave GEVs trapped ***behind*** the Ogre. Beware such "divide and conquer" ploys on the part of the Ogre. When your GEV s escape, they need to think not only of temporary safety, but also of second and third attacks to come!

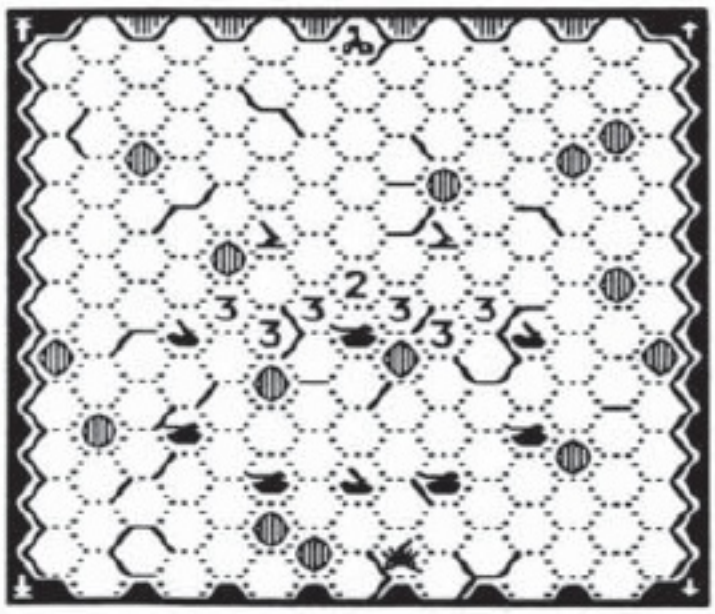
The GEV-centered defense can be very successful against both the Mk III and Mk V Ogres. Be aware, though, that the defense requires discipline, insight, and a keen sense for split-second timing.

The Mixed Defense

The Mixed Defense does not rely on any one class of armor or artillery; instead, it is built around a ***varied*** armor force. Like the GEV-centered defense, the Mixed defense calls for initial intercept forces to slow the invading Ogre. Once the Ogre is slowed, though, the Mixed defense adopts a unique attack style of its own. The Mixed defense's flexibility allows it to throw a variety of weapons at the Ogre ***simultaneously***.

Typically, defensive actions start with a group of GEVs attempting to shoot away about one third of the Ogre's tread sections (the "slow the Ogre" phase of the attack). The first wave(s) of GEVs are backed up by a mixed force of heavy tanks (placed closer to the Combine lines) and missile tanks (placed closer to the CP). This mixed force is very flexible and can attack both the Ogre's weapons systems and its tread sections. Finally, the "front" mixed force is backed by an additional "rear" mixed force, typically formed of missile tanks, missile howitzers, and infantry (some commanders choose additional armor vehicles in lieu of howitzers). The "rear" mixed force surrounds the Command Post with a protective ring of fire, and does its best to stop and/or disarm the (presumably) badly damaged Ogre as it lumbers toward the Command Post.

The precise strategy of the "rear" mixed force is to some extent determined by the condition of the Ogre as it draws close to the Command Post. If the Ogre has few tread sections remaining, the "rear" force can attack the Ogre's weapons first, and then attack tread sections at the penultimate moment. More typically, the Ogre arrives with few weapons remaining, but with a (fairly) healthy complement of tread sections intact. In this case, the "rear" force throws almost all its firepower at Ogre tread sections, addressing Ogre weapons later on.



The Mixed Defense relies on the same principle which makes the GEV defense work; namely, striking the Ogre with a greater level of fire than the Ogre can return. The GEV defense accomplishes this goal by using fragile but fast vehicles which can fire on the Ogre and then escape beyond its range. The Mixed defense accomplishes this goal by using all

available units which may vary in defensive firepower and firing range. Just as the GEV defense forces the Ogre to decide which group of GEVs to pursue, the Mixed defense forces the Ogre to decide which types of vehicles to pursue. The main idea is to force the Ogre to make so-called "no-win" decisions, and to hit the Ogre with crippling fire in the process.

Key Points: Many of the comments made about the Howitzer- and GEV-centered defenses apply for the Mixed Defense. We mention a few specific items the Mixed defense commander must watch.

Early Attack: It is very important to slow the Ogre before it crosses too deeply into the Conflict Zone. The Mixed defense is in some ways more sensitive to this problem than the GEV defense. If the Ogre runs into your "front" mixed force at full speed, there is a real possibility that it will sweep past your heavy tanks and then win the "footrace" to your Command Post. Placement of the "front" mixed force is critical. If the force is placed too far forward (toward Combine lines), your first wave of interceptors will not have enough time to slow the Ogre. If your "front" mixed force is placed too far to the rear (toward your Command Post), you will miss valuable opportunities to make the Ogre pay for every one of its forward movements. Experienced commanders try to arrange the first, second, and third wave forces so that the Ogre is under ***continuous*** attack (i.e., there are ***absolutely no*** moments of respite for the Ogre).

Middle Attack: it is important to keep your "front" and "rear" mixed forces truly ***mixed.*** While we do not fully understand the Ogre's attack algorithms, we believe the Ogre usually has a harder time dealing with ***varied*** types of vehicles as opposed to clusters of ***identical*** vehicles (GEVs excepted). The Mixed defense derives much of its flexibility from striking the Ogre simultaneously with short and long range weapons. Don't lose this advantage when you don't have to. Be wary of Ogres which seem to break off their attack and instead maneuver diagonally across the Conflict Zone. Experience has shown that this is often an Ogre ploy calculated to draw out your forces, ***separating them*** into groups of fast, faster, and fastest vehicles. Once the Ogre separates your force into distinct classes of vehicles, it has a much easier time methodically eliminating one class of vehicle at a time.

Final Attack: As mentioned under other defense sections, above, you must have a keen sense of timing to know when to begin your all out drive to immobilize the Ogre. Infan-

try are again required to play a critical, and sadly, self-sacrificial role in shooting away Ogre tread sections. As the Ogre closes on your Command Post, you must make sure that your infantry squads are in correct position to intercept the Ogre. We remind you once again that a disarmed but mobile Ogre is a ***deadly weapon***!

Comments: The Mixed defense is effective against both Mk III and Mk V Ogres. Of the "classic" defense schemes mentioned here, the Mixed defense is probably the easiest for an inexperienced commander to master. This is true mostly because the Mixed defense offers extra flexibility in selecting targets (at the mid-point of an invasion, both Ogre weapons and tread sections are suitable targets), and because the mixed armored force tends to help the commander recover from (small) tactical mistakes.

Strategic Suggestions For OGRE AI Programmers

Basic Strategy

This manual addresses the particular type of cybertank mission where a ***single*** "Ogre-class" cybertank invades an Alliance-occupied Conflict Zone on its own. In such a mission the cybertank's prime directive is to ***eliminate*** the Conflict Zone Command Post. As a secondary priority, the cybertank should strive to eliminate all (or almost all) Alliance ground forces. As a final priority, the cybertank should return to a friendly service center after clearing the Zone.

Given these priorities, the cybertank's basic strategy revolves around a deceptively simple question:

"How should the cybertank destroy the Alliance Command Post?"

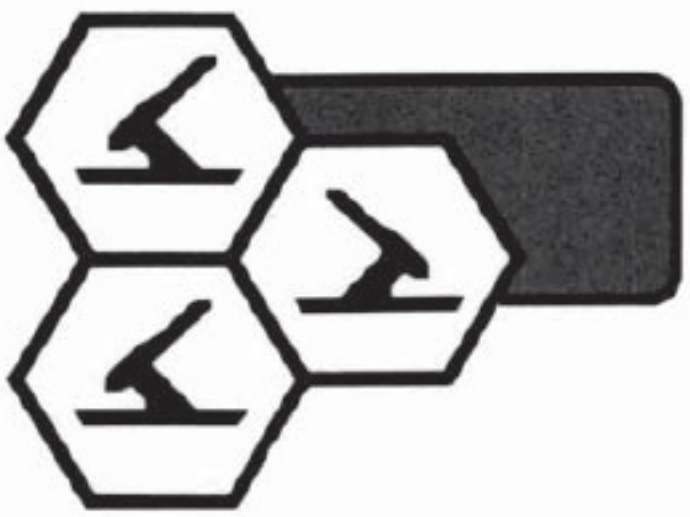
The cybertank's attack algorithms must continuously review and reassess this question as the attack proceeds. Ultimately, the cybertank's options will be to take the Command Post either by firing weapons or by ramming the Post directly. But this is a complex decision, a decision the cybertank can make only in the later stages of its attack.

Experience has shown us a potential problem. Cybertanks can sometimes be diverted from their primary goal (destruction of the Command Post) if they are offered enough enticing opportunities to pursue secondary goals (e.g., destruction of Alliance ground forces). While reaching secondary goals ***is*** important, pursuit of secondary goals ***must never*** prevent the cybertank from fulfilling its prime objective. As you prepare cybertanks for combat missions, we suggest you install strong "initiative refocusing" blocks which prompt the system to look again and again at the unit's primary objective. This should help keep the cybertank focused on the task at hand.

Assessing Alliance Defenses

Alliance defense strategies are as numerous and varied as are our own attack plans. However, experience has shown that Alliance defense strategies usually fall into three fairly distinct categories. We describe these categories, below. We believe these descriptions will be useful for you as you refine the cybertank's pattern-recognition and strategy-planning algorithms.

Howitzer-Centered Defense



Basic Characteristics: Howitzer-centered defenses arrange three or more Howitzers as a protective screen shielding an Alliance Command Post. Usually, the howitzers are placed a good distance forward of the Command Post, and are arranged so that their circles of fire overlap. This overlap creates a broad, deep area which the cybertank can penetrate only by exposing itself to concentrated fire. The theory is that the cybertank will lose all of its weapons and most of its mobility (or vice versa) as it struggles to break through the howitzer line. Although the cybertank will eventually knock out the howitzers, it will be so badly damaged in the process that it will become easy prey for Alliance ground forces.

Response Strategy: The cybertank should determine early on if howitzer-centered defense is being used. If so, the cybertank has several options. One of the best is to enter the Zone only part way, then to spend time moving laterally, thus drawing out Alliance mobile ground forces. The key here is to deal with mobile armor units while they are ***outside*** of the howitzer defense circle (if possible). Once a number of mobile units are eliminated, the howitzers' "ring of fire" becomes much easier to penetrate.

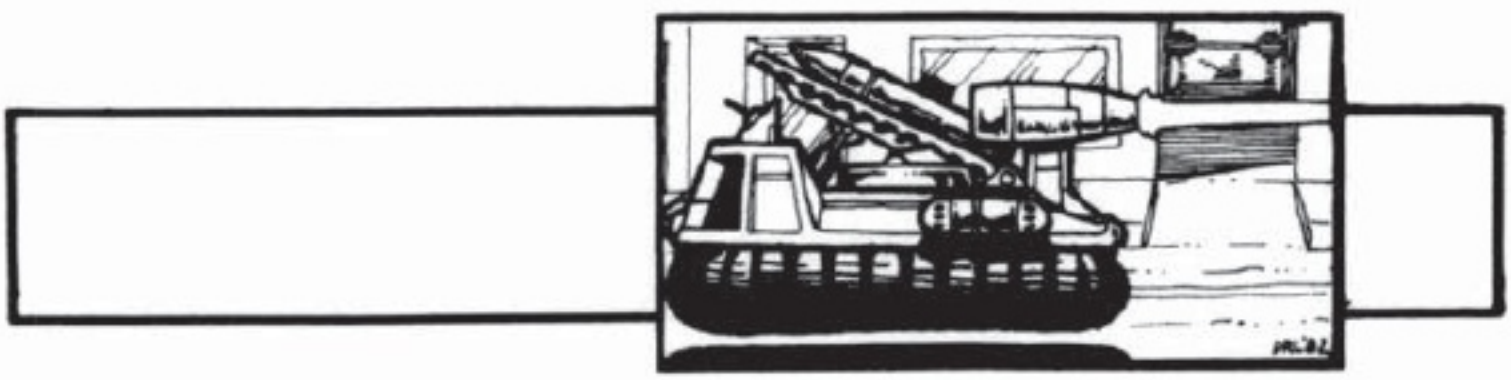
The cybertank must study the arrangement of the howitzers, probing for weak spots. In some cases, for example, the cybertank can all but bypass a howitzer defense simply by taking a roundabout route to the Command Post. If there are no apparent weak spots, the cybertank should, all other things being equal, strive to attack whichever howitzer appears to form the cornerstone for the entire line. The attack should be as simple and direct as possible, minimizing the cybertank's exposure to fierce howitzer fire.

GEV-Centered Defense

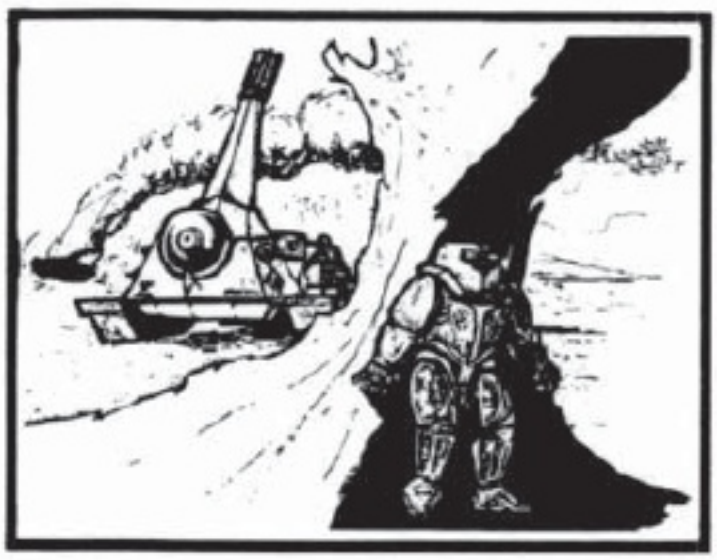
Basic Characteristics: In a GEV-centered defense, the defending commander may well select GEVs as the ***only*** armor units he places in the field. Even if he adds other types of units for balance, GEVs will be the dominant element of his defense. The case for the GEV-centered defense is nearly an inverse of the argument for the howitzer-centered defense. The howitzer defense relies on tightly ***concentrated*** fire coming from a small number of stationary units; the GEV defense relies on broadly ***distributed*** fire coming from a large number of extremely mobile units.

At the start of a typical defensive "scramble," GEVs make individual "hit and run" attacks on cybertank treads (with perhaps a few joint attacks on main batteries). In theory, this approach enables GEVs to overwhelm the cybertank with their superior speed, movement range, and numbers. The intent is to trade off a few GEVs early on for a ***dramatic*** and ***swift*** cutback in the cybertank's mobility. If the cybertank can be slowed, GEVs and Infantry have much more time to stop the cybertank (and attacks will be safer since the damaged cybertank can't give pursuit). The GEV defense is based on the assumption that GEVs can attack cybertanks and then escape to positions of safety. As we shall see, this assumption is not always sound. . .

Response Strategy: The cybertank has the advantage of knowing where GEVs are stationed ***before*** deciding where to enter the Conflict Zone. If possible, use this advantage to enter the Zone at a point where GEV coverage is thin. Once under attack, the cybertank must maneuver to cut off and eliminate small groups of fleeing GEVs. This may entail lateral (or even reverse) movement for the cybertank. This is one situation where it is unwise for the cybertank to press straight toward the enemy's Command Post. Instead, a zig-zag path enables the cybertank to trap fleeing GEVs before they can turn around to make repeat attacks.

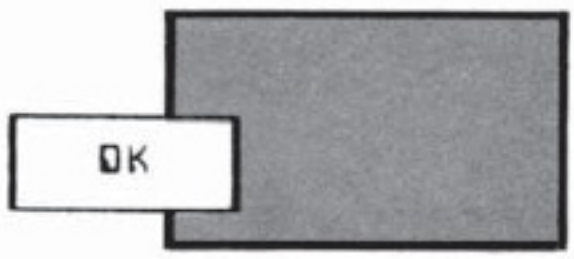


Standard Defense



Basic Characteristics: The standard Alliance defense deploys an even blend of different types of armor along with infantry. Typical forces to commit against a single Mk III cybertank might include: 20 Squads of Infantry, 2 Howitzers, 2 Heavy Tanks, 2 Missile Tanks, and 4 GEVs. The standard defense is very flexible, and enables the Alliance commander to resist the cybertank in several ways. The defense can be optimized to target either cybertank treads or weapons. The standard defense is perhaps the most difficult for the cybertank to "read," since the defense permits Alliance commanders to mask their intentions until the last moment before their units close on the cybertank. If skillfully managed, a standard defensive force can bring numerous types of weapons to bear on the cybertank ***simultaneously.***

Response Strategy: Our cybertanks do quite well against the standard defensive force provided only part of that force is engaged at any given moment. It is often useful for the cybertank to play a waiting game, using some lateral movement to draw the Alliance's faster units forward. The main idea is to string out Alliance forces across the length of the Conflict Zone. In this way, the cybertank can tackle separate groups of armor rather than attempting to forge its way straight through a highly concentrated group of armor units. As the cybertank encounters small groups of armor, it should, where possible, take the added precaution of "sideslipping" past the edges of groups. The sideslip maneuver helps keep the cybertank from being trapped, and helps ensure that the cybertank will arrive at the enemy Command Post with adequate mobility and firepower in reserve.

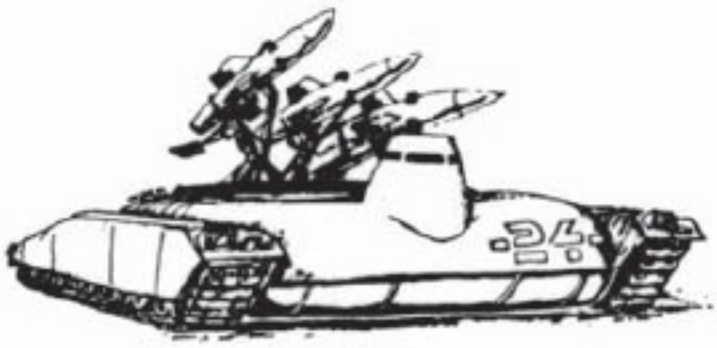


Entry to the Conflict Zone

Alliance commanders almost always locate Command Posts at the rear edge of the Conflict Zone, near the center. Thus, to minimize travel distance across the Zone, and to permit greater flexibility of movement within the Zone, the cybertank should usually enter from a central location. There are a few exceptions to this rule. Some Alliance commanders run the standard defense by placing both their Command Post and the bulk of their defensive forces in a rear corner of the Conflict Zone. When facing forces deployed in this way, the cybertank might benefit from entering the Zone at the ***opposite*** front corner of the Zone. In this case, an entry from the opposite corner tends to lure Alliance forces away from their strong position near the Command Post.

Use of Missiles

Because missiles are the most powerful and longest range weapons in the cybertank arsenal, many AI programmers instruct cybertanks to hold at least a few missiles in reserve to handle contingencies arising late in the attack. On an intuitive level this strategy makes sense, but recent combat analysis by Combine intelligence indicates that the strategy simply does not work. In far too many cases, missiles are destroyed without ever leaving their launching tubes. Thus, the latest Combine doctrine holds that missiles should be held back only so long as the cybertank's "conventional" guns are able to handle nearby Alliance armor units. In all other cases, the missiles should be treated like any other weapon in the cybertank arsenal, and should be used as needed. This does ***not*** mean that missiles should be used haphazardly (e.g., to attack a single squad of infantry). It ***does*** mean that missiles can and should be used on a wide range of appropriate targets (e.g., to destroy Command Posts, or to eliminate Howitzers or armor units blocking the cybertank's path). Over a century ago, the first builders of nuclear weapons said it best: "Use 'em or lose 'em."



Use of Terrain

Since both MK III and MK V cybertanks are free to move over all but the most difficult land surfaces, most AI programmers give little attention to terrain (apart from avoiding such obvious hazards as full-size bomb craters and swamps). To be blunt, this is a mistake. While terrain does little to affect the cybertank, it ***does*** affect the cybertank's enemies (in particular, very few vehicles can cross huge piles of battlefield rubble the way a cybertank can). In many cases, the cybertank can use rubble or bomb craters to block pursuit from Alliance armor units.

Some AI programmers send cybertanks along the very edges of impassable areas. The theory is that, in following this path, the cybertank can be attacked from one side only. This approach carries some merit. However, recent Combine combat analysis shows that "edge" movement is ***not*** a good solution. The cybertank must trade freedom of movement for (relative) safety. The tradeoff is not a good one. We suggest you program cybertanks to search for travel paths which lie somewhere between the center and the perimeter of the Conflict Zone.

OGRE
Artificial Intelligence

The first step in designing the Ogre's Artificial Intelligence (OAI), was to determine just what an Ogre should do. This required much research into how 'experts' played the game, in addition to many hours of game play to test various OAI concepts. The single most difficult aspect of designing the OAI was the fact that **OGRE** is a game based on probabilities. Every time the Ogre fires at a defender there is a chance of hitting, disabling or missing. Assessing all of these chances for every possible combination of targets the Ogre may have, for every possible move the Ogre can make, evolved into a monumental task.

The Ogre's ultimate goal is to destroy the Command Post (CP) and get away. Its highest priority is to destroy the CP. Its second priority is to get away. On its way to the CP, the Ogre will be trying to destroy as many defenders, while sustaining as little damage to itself, as it can. This means the Ogre must not blindly dog a path straight to the CP, or the defense would merely set up a gauntlet that would destroy the Ogre before it could reach the CP.

The Ogre employs two intelligence techniques: strategic and tactical. Ogre Strategy involves long-range targetting of howitzers and the CP and avoiding terrain traps created with the editor. Ogre Tactics involve short-range maneuvers while en route to its next long-range target.

At any given time, there is a limited number of hexes the Ogre can legally move to. Some of these hexes are more advantageous to the Ogre than others. The Ogre's tactical intelligence determines which hex has the highest value.

The factors that are involved in determining the value of a hex are:

1) the distance of that hex from the current long-range target (i.e. howitzer or CP)
2) the value of the defenders the Ogre can attack from that hex
3) the amount of damage the Ogre may suffer in that hex

The steps in determining the Ogre's best move look something like this:

1) Find a legal path to a target hex
2) Determine the value of the defenders the Ogre can attack from the target hex (henceforth referred to as **AttackVal**)
3) Determine the amount of damage the Ogre may suffer in the target hex (henceforth referred to as **DamageVal**)
4) Determine the value of the target hex using its distance from the current long-range target, and the hex's **AttackVal** and **DamageVal**

These steps are performed for every hex the Ogre can reach from any given position. The Ogre then moves to the hex with the highest value.

Each defender is assigned a relative value by which the Ogre assesses their worth. For each hex the Ogre can reach, every defender that can be fired upon from the target is assigned a percent chance of being hit (%HIT). As the Ogre rams, overruns, or hits the various targets, those target's %HIT will be increasing (usually). As soon as the Ogre has completed its simulated attack from the target hex, each piece will have its relative value modified by the Ogre's percent chance to hit it. The summation of the piece's modified relative values will be the target hex's **AttackVal.**

The same %HIT will be used to modify each piece's ability to damage the Ogre from any given target hex and the summation of these values will be the target hex's **DamageVal.**

The remainder of this section explains the techniques that are used in determining strategic targetting and in performing the four steps outlined above for computing the next best hex.

Strategic Long-Range Intelligence

Due to the long-range striking power of howitzers, it is necessary for the Ogre to be able to plan an overall strategy concerning howitzers. If it weren't for the howitzers, the Ogre could play a good game without looking more than 1 move ahead (except for being drawn towards the CP). Sometimes it is best to make the CP the only long-range target and disregard any howitzers. Other times it is necessary to target certain howitzers, or a sequence of howitzers, before heading for the CP.

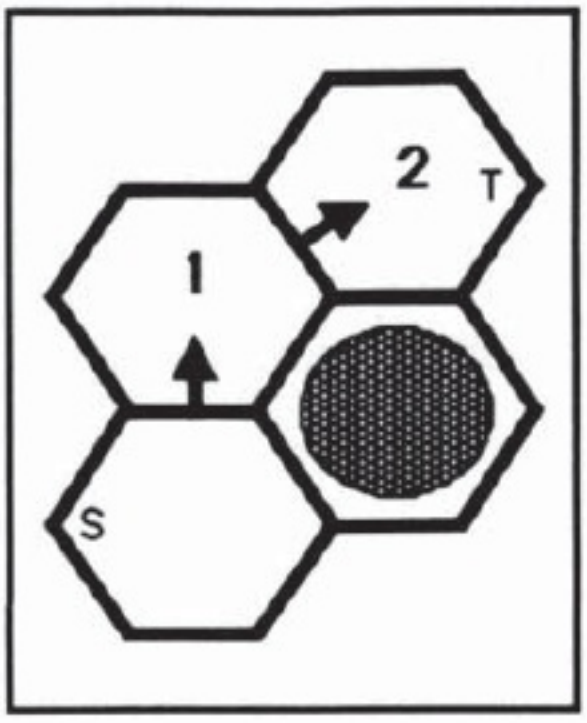
There are two main considerations when planning Ogre strategy strictly around howitzers and the CP: 1) getting to the CP in the least number of turns, and 2) suffering the fewest number of howitzer hits in the process.

The strategies the Ogre will consider will vary in value based on the defender's howitzer setup. One approach will be to target the CP alone. Another will be to target each howitzer, prior to the CP, in varying orders. The prime strategy will be the one that gets the Ogre to the CP in the fewest number of turns with the least number of hits.

The final long-range goal the Ogre will consider is leaving the map. This is a goal the Ogre will never consider unless the CP has been destroyed. Once the CP has been destroyed, the Ogre will try to leave the map as quickly as it can.

Tactical
Short-Range Intelligence

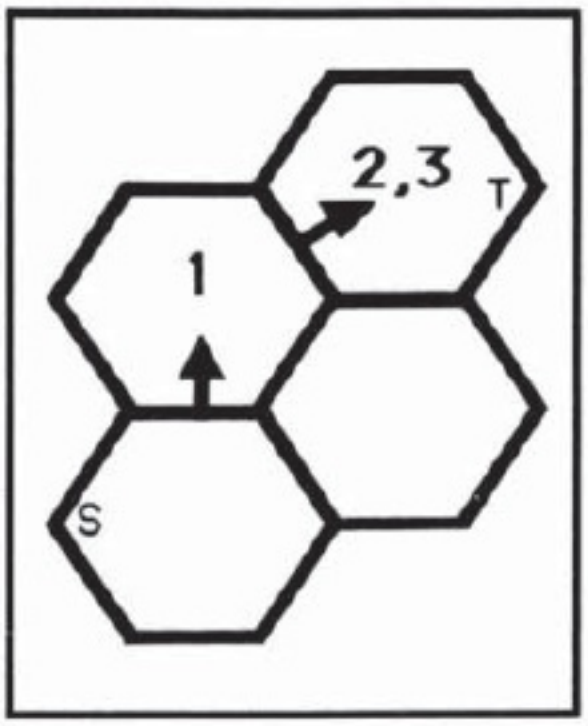
A finite number of PATHS are available to the Ogre and a complete list of these paths was compiled. The list consisted of 58 paths for any one of the six facings from a source hex.



Selecting a Path

In the path representation, the letter "S" denotes the SOURCE hex (or starting hex), and the letter "T" denotes the TARGET hex (or destination hex). The arrows show direction of movement. The numbers label each move. The shaded circles represent craters. The example below illustrates using two movements to go a distance of two hexes.

The Ogre will start looking at paths that have a distance of 1 and work up to paths that have a distance equal to its current movement value.



Certain paths are designated as RAM paths (Rpath). An Rpath is a path that does not use the direct route to the target hex. The purpose of an Rpath is to attempt to ram a defender (or overrun infantry) while en route to the target hex. Illustrated is an Rpath that is almost identical to the above path. Both paths have the same source and target hexes. The difference is that upon arriving at the target hex the Ogre expends a third move to potentially ram a defender a second time.

If no ram, or overrun, has occurred upon reaching the end of an Rpath, then no attempt is made to evaluate the target hex for its **AttackVal** and **DamageVal**, since the target hex will already have been evaluated by a previous, more direct path.

Actual game play allows a 50% chance of destroying a mobile armor unit with a single ram. For simulation purposes, however, if an active mobile armor unit

is rammed, it will be marked as disabled and assigned a 75 %HIT. If a disabled, or immobile, unit is rammed it will be assigned a 100 %HIT. If an INF1 is overrun it will be assigned a 100 %HIT. If an INF2 or INF3 is overrun it will be reduced to an INF1 or INF2, respectively, and **AttackVal** will be increased by the value of an INF1.

Ramming an armor unit costs the Ogre 1 tread unit. It was therefore necessary to assign a value to the Ogre's treads so that the **DamageVal** could be increased whenever the Ogre decides to ram. Decreasing this tread damage constant causes the Ogre to ram more frequently.

If, after all legal paths have been simulated and the Ogre is actually moving along the selected path, a single ram destroys an active, mobile armor unit anywhere before the end of that path, then the Ogre will re-evaluate a new path using the remainder of its movement value. This is necessary due to the fact that, in actuality, the Ogre has a 50% chance of destroying a mobile, active armor unit with one ram only, whereas the simulation logic always counts a single ram as a disable with a 75 %HIT.

The Ogre must have at least 3 treads to ram a heavy tank and 2 treads to ram all other armor units, except the CP (so it won't immobilize itself).

Evaluating a Hex's Attack Value

The "attack value" of a position to the Ogre is represented by **AttackVal**. Each defender will have a relative value assigned to it, referred to as **AttackVal(defender).** These relative values look something like this:

1) CP	: 255	**5)** Heavy Tank	: 100
2) Howitzer	: 200	**6)** Infantry 3	: 60
3) GEV	: 100	**7)** Infantry 2	: 40
4) Missile Tank	: 100	**8)** Infantry 1	: 20

AttackVal will be based upon the cumulative **AttackVal(defender)** for each defender the Ogre can bring weapons against. The Ogre will deploy its weapons against all possible defenders and assess the potential value of those defenders. The weapons are deployed in this order:

1) Antipersonnel (**AP**)
2) Secondary Batteries (**SB**)
3) Main Batteries (**MB**)
4) Missiles (**MSL**)

If there are no defenders at exactly 3 hexes away from the Ogre's targetted hex then MB's will be processed before SB's. This is because there is no point in holding the MBs for a target out of reach of the SBs if there aren't any.

Each time the AttackVal of a hex is determined, every defender will be initially assigned a 0% chance of being hit (%HIT) by the Ogre. As the Ogre simulates a hit against a target, the target's %HIT will be increased. As soon as the Ogre has completed its simulated attack for all weapons, each piece will have its %HIT multiplied by its relative value. The summation of the piece's modified relative values will be the target hex's **AttackVal.**

In determining a target's %HIT for any given weapon, the ratio of the Ogre weapon's attack strength to the target's defense strength is used. The %HIT values for both enabled and disabled targets for each of the various odds are as follows:

ODDS	Percent Chance To Hit Enabled Pieces	Percent Chance To Hit Disabled Pieces
less than 1–2	0%	0%
1–2	25%	33%
1–1	50%	67%
2–1	67%	83%
3–1	83%	100%
4–1	92%	100%
better than 4–1	100%	100%

Infantry 1 targets are counted as disabled pieces.

1) Antipersonnel

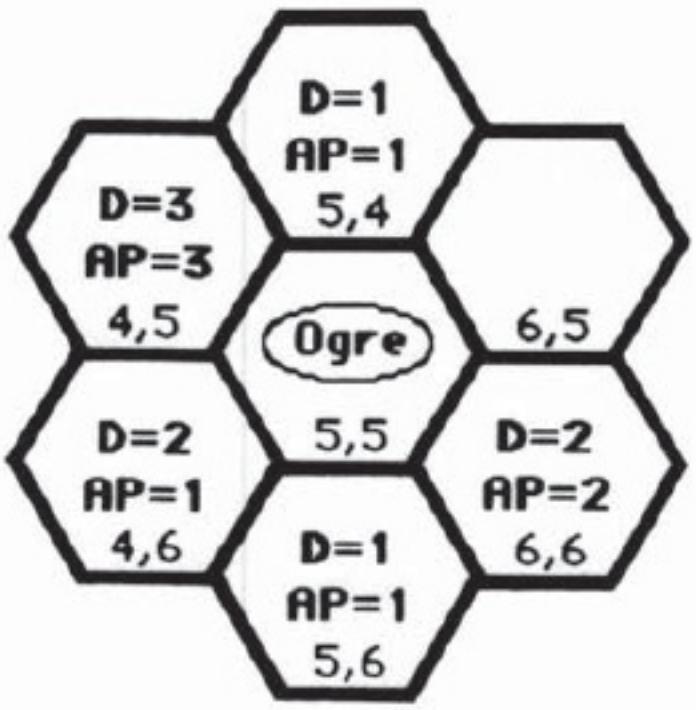
Since the Ogre only gets one attempt with antipersonnel (**AP**) against infantry, it must deploy its **AP** with optimum efficiency. The algorithm outlined below assumes optimum deployment consists of hitting as many pieces as possible. It, therefore, deploys starting with the lowest odds (1–2) and works its way up.

The algorithm goes as follows:

- Sort the infantry within 1 hex of the Ogre in descending order of defense points (**D**)
- Go 1–2 starting at the bottom of the list and working up
- Go 1–1 starting at top and working down
- Go 2–1 starting at top and working down, skipping 1s (**D**=1)

- Go 3–1 starting at top and working down, skipping 1s
- Go 4–1 starting at top and working down, skipping 1s
- Go 2–1 starting at top and working down, including 1s
- Go 3–1 starting at top and working down, including 1s
- Go 4–1 starting at top and working down, including 1s
- Put remaining **AP** on lowest infantry

The diagram below depicts the Ogre surrounded by 5 infantry units that have a combined defense value (**D**) of 9. The following example uses the above algorithm to determine the **AP** values represented in the diagram.



1. Sort them in descending order:
   D = 3 2 2 1 1
   ---
2. Deploy at 1–2 from bottom to top:
   D = 3 2 2 1 1

   A = 1 1 1 1 1
   1
   It defaults to 1–1 against **D** = 1 since you can't get a 1–2.
3. Deploy at 1–1 from top to bottom:
   D = 3 2 2 1 1

   A = 1 1 1 1 1
   1
   1 1

The last **AP** was deployed against the first '2' in the list, so the loop is exited.

The **AP** deployment now equals the values you see in the diagram above.

Once the AP are deployed, they will be used in a simulated attack against the selected targets. The ratio of AP to DP will be used to determine the %HIT used in modifying the **AttackVal(defender)** and the defender's damage potential next turn. If, for example, the Ogre deploys 2 AP against an infantry 3, then the ratio will give 1–2 odds which renders a 25% chance to hit the infantry.

2) Secondary Batteries

First, all targets within range (2 hexes) of the **SB**s are listed. Then, the cumulative %HIT for those targets is computed.

Deploy 1 **SB** against the defender with the most valuable target with the lowest cumulative %HIT. If there is a tie for the most valuable target, then the defender that is closer to the Ogre's current long-range target has priority. Using the ratio of the attack strength of the **SB** and the target's defense strength, determine the cumulative %HIT. Use the new %HIT to re-compute the target's value. Repeat the **SB** deployment until all **SB**s are used or until all targets have a 100 %HIT.

3) Main Batteries

This is done the same way as the SBs.

4) Missiles

Missiles will be deployed similarly to the main and secondary batteries but with a few modifications. It is desirable that missiles be reserved as long as possible for use against howitzers or the CP. The missiles will, however, be deployed if it appears they may be destroyed.

Once all weapons have been deployed, the targetted pieces will have their relative values modified by their %HIT and the total of these values will be assigned to **AttackVal.**

Evaluating a Hex's Damage Value

All of the defenders that can strike against the Ogre for a particular move contribute to a hex's **DamageVal**.

It was necessary to establish a meaningful relationship between **AttackVal** and **DamageVal**. The first step in doing this was to determine what the Ogre would consider an even trade of damage inflicted for damage received. A constant was arrived at that is multiplied by the total attack points of the defenders that can reach the Ogre in the target hex.

The formula to determine **DamageVal** for a particular hex looks something like this:

DamageVal = (Defender Attack Points) × Damage Constant

Modifying the Damage Constant makes the Ogre play more aggressively or more cautiously.

All defenders are checked to see if they can strike the Ogre on their turn (taking into account the defender's attack range, movement value and terrain). The attack strength of each defender is modified by their %HIT computed by the attack evaluation logic.

Evaluating the Draw of a Long-Range Target

TargetVal is the variable that causes the Ogre to move towards the current long-range target (i.e. a howitzer or the CP). There are three situations when considering the Ogre's movement relative to its current target:

1) decreasing its distance (a positive effect)
2) not changing its distance (a negative effect)
3) increasing its distance (a strong negative effect)

When moving towards its current target, the best the Ogre can do is decrease the distance by the amount of its movement value. Anything less than this is suboptimal when considering movement only. If the Ogre can increase its advantage by not moving as close to its target as it can in order to destroy a defender(s), then it should do so.

The technique for determining **TargetVal** is to divide a constant by the Ogre's maximum movement value and multiply the result by the number of hexes that the Ogre moves towards its current target (a positive value) or away from its current target (a negative value).

Several factors may modify the attraction of a target. Some of the factors are:

- Often, it is desirable to move away from the current target in order to destroy a relatively defenseless defender(s). Thus, a path that shows a high attack value with little or no damage value is weighed positively, whether it is far away from the current long-range target or not.

- If the Ogre is in a howitzer umbrella, then the Ogre will have a greater tendency to move towards its current long-range target, thus keeping the howitzer from getting too many shots at it.

- If the current long-range target shows at least a 50% chance of being destroyed (which is also a sure disable), then the Ogre will be pulled to the next long-range target. This will keep the Ogre from getting closer to the current target than it has to in order to destroy it.

- In order to keep the Ogre from 'wimping out' (i.e., running scared), a path that moves away from the current long-range target that shows zero Attack Value, is weighted negatively.

Once all of the factors for a hex have been evaluated, they can be combined to arrive at the overall value for that hex.

The formula for determining the value of a hex is:

HexVal = AttackVal − DamageVal + TargetVal

The Ogre performs these computations for every legal move it can make from its current location, then selects the hex that has the greatest value.

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